Serial No. 09/782,279
Art Unit 1742

Remarks

Claims 1, 7, 9, 13 and 14 have been amended, claims 6, and 10 to 12 have been cancelled, and claims 15 to 23 have been added. No new matter has been added by way of these amendments. Reexamination and reconsideration of the application as amended is requested.

Claims 1, 3-6 and 12-14 have been rejected under 35 U.S.C. 102(e) as being anticipated by U.S. 6,342,150 (Sale et al.). Applicant respectfully submits that the new claims are not anticipated by Sale et al. Specifically, with respect to independent claim 1, the subject matter therein is directed toward a "flow-through electrochemical reactor", comprising an anode and a cathode, wherein "each have a pore size to withstand a forced flow of wastewater up to 60 litres/minute". Amended claim 1 is clearly supported by the original specification (see paragraph [0036]).

The electrochemical reactor of the present application was developed after considerable research. An object of developing such a reactor and process is the destruction of organic compounds by electrooxidation. The targeted compounds are: phenol and o-, m-, p-cresols. The origin of the wastewater was the debarking industries, and the water from this type of industrial activity is full of organic molecules. With the present invention the inventors were able to destroy phenol and cresols among various other organic species.

Since the quantity of wastewater that is being used in the debarking industries is high (millions of liters per day), the first idea was to build a reactor capable of treating a large volume of water in the most efficient way and without disturbing significantly the activities of the industry. Pumping the water into a reactor that will allow the passage of the fluid through an electrooxydizing material without generating a detectable back-flow, has been viewed as the best method to reach all goals. Oxidation, obtained by an electrochemical reaction, requires the use of electrodes: anodes and cathodes. At the time the research was started and undertaken, no one used foam-like anodes, made of sponge-type metallic structure covered with anodic material such as DSA-type (like SnO_2 or IrO_2.

The invention is based in part on the use of an anode and a cathode with the mechanical strength to withstand high fluid pressure resulting from a pumped flow of fluid. The electrodes are made of a thick metallic foam of a pore size to "allow a free flow, of the wastewater to be treated, with a minimum of flow restriction." (paragraph [0034])

Sale et al., discloses an apparatus for treating wastewater, using an anode and a cathode. Sale et al., recognizes the importance of the anode and cathode having characteristics "based upon a number of factors including...the flow rate of the water containing contaminants." (col. 5, lines 13 to 16). However Sale et al., does not contemplate high flow rates as the present invention does. In fact Sale et al., "relies upon the natural flow of the ground water to move contaminants through the system" (col. 3, lines 50 to 51). Therefore, Sale et al., cannot possibly disclose or teach anode and cathode configurations able to withstand high flow rates, especially flow rates up to 60 litres per minute of reactor capacity as does the present invention.

Particularly, Sale et al., discloses two examples, each of which has a flow rate of "approximately 1 foot per day" (col. 6, lines 30 and 57). As such Sale et al., cannot have insight toward the resulting structure of the anode and cathode to withstand a high flow rate. It is submitted that Sale et al., does not teach or even suggest the use of higher flow rates as disclosed in the present application. Further, it is submitted that the apparatus of Sale et al., and in particular the electrodes, would not be able to withstand the flow rates contemplated by the present application. Therefore, claim 1 defines subject matter that is novel over Sale et al.

It is well established law that:

> "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently, described in a single prior art reference." Verdegaard Bros. V. Union Oil Co. of California, 2 USPQ2d 1051.

Clearly, Sale et al., does not teach that the anode and cathode have pore sizes to withstand high flow rates and cannot therefore anticipate claim 1.

Dependent claims 3-5, 13 and 14 depend either directly or indirectly from independent claim 1 and include all the limitations of its parent claim. Therefore, the dependent

claims are believed to be distinguished over the cited references for at least the same reasons as those given to claim 1. As well, claims 13 and 14 have been amended to further qualify the target substance which the apparatus claimed is directed.

Claims 2, 7, 8, 10, and 11 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Sale et al., in view of U.S. 6,328,875 (Zappi et al.). Of these, claims 10 and 11 have been cancelled. Claims 2, 7 and 8 depend from independent claim 1 and are patentably distinguished from Sale et al., for at least the reasons cited above with respect to claim 1. It is submitted that Zappi et al., does not disclose the use of high flow rates, and claim 1 is also distinguished from Zappi et al. Zappi et al., discloses the use of a "fully open" (col. 10, line 2) electrochemical cell. The solution to be treated is introduced to the electrodes by a feeder. The purified water then drips (see Figure 1) into an open tank. No specific flow rates are provided, although the flow rate is adjustable "to provide effective destruction of pollutants." (col. 11, line 5). However, based on the configuration of the cell, it can easily be determined that the flow rate cannot be as high as is contemplated by the present invention. Since claims 2, 7 and 8 depend from claim 1, they also are distinguished from Zappi et al. Since both Sale et al., and Zappi et al., are deficient in the same manner, these claims are also distinguished from the combination of the two references. Further, it is noted that both Sale et al., and Zappi et al., are for purifying water, while the present invention is directed to withstand industrial applications.

In order to establish a case of obviousness under 35 USC 103(a), it is well established that:

> "there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach all the claim limitations". See MPEP 2143.

New claims 15-17 depend from claim 1 and further qualify characteristics of the reactor, and claims 18-21 have been added and further qualify that the electrodes are covered by a conductive coating, and are also dependent on amended claim 1. These claims are allowable for at least the reasons given with respect to claim 1. New claims 22 and 23

are independent claims directed toward the system and the method, respectively of the present application. Claims 22 and 23 include the limitation that the anode and cathode have pore sizes to withstand high fluid rates, and is allowable for at least the reasons given with respect to claim 1.

Reconsideration and allowance are therefore respectfully requested. If the Examiner has any suggestions that might result in speedy allowance he is requested to telephone the undersigned.

Respectfully submitted,

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